

## MALATHION

### Analysis

Standard method used for the analysis of Malathion in variety of matrices

Sample matrix	Sample Preparation	Assay Procedure	Limit of Detection	Reference
Liquids, Technical material and solids	Dilute (acetonitrile or chloroform)	GC/FID	not given	Horwitz (1980); Zweig & Sherma (1972)
Liquids, granules and dust	Extract (methanol)	HPLC/UV	not given	US. EPA (1976)
Emulsifiable concentrate, technical liquid and powders	Extract (hexane); chromatograph (cellulose); evaporate; dissolve (ethanol or isopropanol); add potassium hydroxide, water and nitric acid	Potentiometric titration (argentimetric)	not given	Horwitz (1980)
Emulsifiable concentrates, dust, granules and water-dispersible powders	Extract (carbon disulphide)	IR spectroscopy	not given	US. EPA (1976)
Emulsifiable concentrates, technical materials, water-dispersible powders and dust	Extract(solvent specific to matrix); hydrolyse (sodium hydroxide/ organic solvent); complex (cupric naphthenate)	Colorimetry	not given	Horwitz (1980)
Plant material	Prepare as above (cupric salt method)	Colorimetry	0.2 mg/kg (fruit) 0.5 mg/kg(vegetable)	Sutherland (1964); Markus & Puma (1973)
Fruits, vegetables and fresh foliage	Extract (chloroform); dry (sodium sulphate); evaporate; dissolve (acetone)	GC/FID	0.05 mg/kg	Zweig & Sherma (1972)
Oily seeds, nuts, grains and dry hays	Extract (chloroform); dry (sodium sulphate); partition to remove oils (acetonitrile/hexane); evaporate acetonitrile layer; dissolve (acetone); precipitate; filter; then proceed as above for fruit, ect.	GC/FID	0.05 mg/kg	Zweig & Sherma (1972)

Non-fatty food products; fruits and vegetables	Extract (acetonitrile); dilute water extract (petroleum ether); chromatograph (Florisil)	GC/TD or GC/FPD <sup>b</sup>	0.01 mg/kg	Horwitz (1980)
Milk	Sweep co-distill	GC/FID	0.01 mg/kg	Markus & Puma (1973)
Human milk, human and animal tissue	Macerate (acetonitrile); partition (aqueous sodium sulphate/hexane); concentrate; chromatograph (Florisil); concentrate	GC/ECD <sup>b</sup>	not given	Watts (1980)
Human tissue and excreta	Extract (aqueous acetone); concentrate; saturate with sodium chloride; extract (hexane); chromatograph (deactivated silica gel); concentrate	GC/FPD <sup>b</sup>	< 0.1 mg/kg	Watts (1980)
Human and animal adipose tissue	Macerate (sand); extract (petroleum ether); extract (acetonitrile); partition (petroleum ether); concentrate; chromatograph (Florisil); concentrate	GC/ECD <sup>b</sup>	not given	Watts (1980)
Air	Collect on filter; extract (isoctane)	GC/FPD	8-35 mg/m <sup>3</sup>	Taylor (1977)
Ambient air	Soxhlet extract (hexane/diethyl ether/acetone); concentrate	GC/FPD <sup>b</sup>	0.9 ng/m <sup>3</sup>	Watts (1980)
Water	Extract (dichloromethane); chromatograph (deactivated silica gel)	GC/FPD <sup>b</sup>	4µg/kg	Watts (1980)
Sediment	Air dry; elute on chromatographic column (acetone/hexane); extract (aqueous sodium sulphate); extract water layer (hexane/dichloromethane); combine solvent extracts; wash (water); dry (sodium sulphate); concentrate; chromatograph	GC/ECD <sup>b</sup>	not given	Watts (1980)

	(Florisil)			
				<sup>a</sup> Abbreviations: <b>GC/FID</b> , gas chromatography/flame ionization detection; <b>HPLC/UV</b> , high-performance liquid chromatography/ultra-violet, absorbance detection; <b>IR</b> spectroscopy, infra-red spectroscopy; <b>GC/TD</b> , gas chromatography/potassium chloride thermionic detection; <b>GC/FPD</b> , gas chromatography/flame photometric detection; <b>GC/ECD</b> , gas chromatography/electron capture detection <sup>b</sup> Confirmation by thin-layer chromatography, extraction <i>p</i> values or polarography
		Parathion		

## Analysis

Standard method used for the analysis of Parathion in variety of matrices

Sample matrix	Sample Preparation	Assay Procedure	Limit of Detection	Reference
Liquids Formulation	Dilute (chloroform) or extract (methanol)	HPLC/UV	not given	Horwitz (1980); US. EPA (1976)
Liquids Formulation	Dilute (carbone disulfide) or extract (acetone)	GC/FID	not given	Horwitz (1980); US. EPA (1976)
Dust and powders	Soxhlet extract (diethyl ether); extract (chilled aqueous sodium carbonate); acidify (acetic/hydrochloric acids); heat; reduce (zinc); filter; add sodium bromide	Titration with sodium nitrite	not given	Horwitz (1980); Sutherland & Miskus (1964)
Dust and powders	Extract (ethanol); filter; reflux (potassium hydroxide/ aqueous ethanol)	Colorimetry	not given	Horwitz (1980)
Micro-encapsulated formulations	Grind; extract (acetonitrile)	GC/FID	not given	Association of Official Analytical Chemist (1980); Horwitz (1980) ; Karr (1980)

Fruit	Strip (benzene); dissolve (aqueous ethanol); acidify (hydrochloric acid); reduce (zinc); add sodium nitrite and sodium sulphamate; derivatize [ <i>N</i> -(1-naphthyl)ethylene-diamine]	Colorimetry	5µg	Sutherland & Miskus (1964)
Nonfatty foods	Extract (acetonitrile); dilute (water); extract (petroleum ether); chromatograph (Florisil)	GC/TD <sup>b</sup>	0.01 mg/kg	Horwitz (1980)
Vegetables	Extract (ethyl acetate/sodium sulphate); decant; sweep co-distill	GC/TD	0.01 mg/kg	Horwitz (1980)
Human or animal adipose tissue	Macerate (sand); extract (petroleum ether, acetonitrile); partition (petroleum ether); chromatograph (Florisil)	GC/ECD <sup>b</sup>	not given	Watts (1980)
Human milk, human and animal tissue	Macerate (acetonitrile); partition (aqueous sodium sulphate/hexane); chromatograph (Florisil)	GC/ECD <sup>b</sup>	not given	Watts (1980)
Human tissue and excreta	Extract (aqueous acetone); saturate (sodium chloride); extract (hexane); chromatograph (silica gel)	GC/FPD <sup>b</sup>	not given	Watts (1980)
Plasma	Extract (acidified hexane) centrifuge	GC/ECD	not given	Zweig & Sherma (1972)
Air	Collect (impinger with ethylene glycol); extract(hexane)	GC/FPD	5 µg/m <sup>3</sup>	Taylor (1977a)
Air	Collect (glass-fibre filter); extract (iso-octane)	GC/FPD	0.07 mg/m <sup>3</sup>	Taylor (1977b)
Ambient air	Soxhlet extract sampling medium (hexane/diethyl ether/acetone)	GC/FPD <sup>b</sup>	4 ng/m <sup>3</sup>	Watts (1980)

Water	Extract (dichloromethane); chromatograph (deactivated silica gel)	GC/FPD <sup>b</sup>	16 µg/kg	Watts (1980)
Sediment	Dry; blend; transfer to a chromatograph; elute (acetone, hexane); extract(aqueous sodium sulphate); extract water layer (hexane/dichloromethane); combine extracts; wash (water); dry (sodium sulphate); chromatograph(Florisil)	GC/ECD <sup>b</sup>	not given	Watts (1980)

<sup>a</sup>Abbreviations: **HPLC/UV**, high-performance liquid chromatography/ultra-violet absorbance detection; **GC/FID**, gas chromatography/flame ionization detection; **GC/TID**, gas chromatography/potassium chloride thermionic detection; **GC/ECD**, gas chromatography/ electron capture detection; **CG/FPD**, gas chromatography/flame photometric detection

<sup>b</sup>Confirmation by thin-layer chromatography, extraction *p* values or polarography

## TETRACHLORVINPHOS

### Analysis

Standard method used for the analysis of TETRACHLORVINPHOS in variety of matrices

Sample matrix	Sample Preparation	Assay Procedure	Limit of Detection	Reference
Crops and animal tissue	Grind; extract (oily crops and tissue, solvent partition); chromatograph (Florisil/Celite)	GC/Phosphorus-sensitive thermionic emission detector	0.03 mg/kg	Markus & Puma (1973)
Milk	A sequence of extractions	GC/Phosphorus-sensitive thermionic emission detector	0.03 mg/kg	Markus & Puma (1973)
Human or animal adipose tissue	Macerate; a sequence of extractions; chromatograph (Florisil)	GC/ECD	not given	Watts (1980)

<sup>a</sup>Abbreviations: **GC**, gas chromatography; **GC/ECD**, gas chromatography/electron capture detection

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